

this area of low pressure was central near, and to the west of, Bismarck, Dakota, at the time of the occurrence of the destructive tornadoes in Minnesota. Strong south to east winds were reported in eastern Minnesota at 3 p. m. of that date, while in western Minnesota the winds were from the south and blowing at the rate of from thirty to thirty-five miles per hour. This storm passed directly north from Dakota and disappeared on the 15th, the centre being located far to the north of Manitoba at midnight of that date.

V.—This area of low pressure is marked as central in Colorado on the morning of the 22d, but the tri-daily reports of the 19th, 20th, and 21st indicated that it originated to the south of Arizona the depression moving first to the north over the central plateau regions. It passed directly northeast from Colorado and was central in eastern Dakota at the 10 p. m. report of that date. After reaching the latitude of N. 45° the course changed to the east and it passed over the upper lake region with decreasing energy, the pressure increasing within the enclosed area until it was apparently replaced by the advance of a high area from the north. When this storm was passing over the Lake region a more marked depression appeared to the northward and passed over the lower Saint Lawrence valley. The area of high pressure which followed this last named storm caused the area traced as number iii to disappear before reaching the Atlantic coast. Although this storm cannot be traced to the eastward by isobars drawn for each tenth of an inch of pressure, the severe local storms which occurred in the middle Atlantic states on the 24th indicated that it passed off the middle Atlantic coast, moving slightly to the south of east.

VI.—The tri-daily reports of the 23d indicated the advance of a low area from the Rio Grande Valley but this storm was not clearly defined as an area of low pressure until the afternoon of the 24th, when it was central in northeastern New Mexico. It moved northeastward of Kansas, Nebraska, and Minnesota during the 25th and 26th, attended by heavy rains and severe local storms in the northwestern states, the disturbance reaching its maximum force when central in northwestern Wisconsin on the 26th. From northern Wisconsin it moved directly north, passing over Lake Superior, and after apparently circling to the westward it disappeared north of Manitoba on the 27th.

VII.—This low area formed over the middle slope on the 27th and moved slowly eastward over Kansas and Iowa during the 28th and 29th, the depression being trough-shaped and extending southward to the Gulf coast. The northern portion of this low area apparently disappeared after passing to the east of the upper Mississippi valley, although a slight disturbance may be traced to the south Atlantic coast during the 30th, as indicated by the storm track traced on chart i. Severe local storms occurred in the Gulf States on the 28th, apparently due to a secondary depression which formed in the southwest and south. These storms were especially severe in the southern portion of the east Gulf States on the 28th and 29th.

NORTH ATLANTIC STORMS DURING APRIL, 1886.

[Pressure in inches and millimetres; wind-force by Beaufort scale.]

The paths of the depressions that have appeared over the north Atlantic Ocean during the month are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of ships' logs and other data collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports received through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs furnished by the proprietors of the "New York Maritime Register," and from other miscellaneous data, received at this office up to May 21, 1886.

Of the thirteen depressions traced during the month only one, number 3, is a continuation of an area of low pressure traced on the North American continent; number 4 is traced

on the coast of Ireland; number 7 originated northeast of the Bahamas; number 10 appeared in the Gulf of Saint Lawrence; and number 13 developed near Charleston, South Carolina; the remaining depressions developed over the ocean east of W. 50°, from N. 37° to 50°.

The following presents the characteristics of the depressions traced for the present month, as compared with those traced over the north Atlantic in April, 1885: In April, 1885, the general course of the storms was northeasterly, and the tracks were located within a narrow belt of a few degrees width; during April, 1886, the directions of movement exhibit the greatest diversity, and their positions extend from N. 37° to 55°, in longitude from W. 50° to the European coast. A third noticeable characteristic of the storms of the present month is their exceedingly slow rate of progression.

In three depressions, viz., numbers 1, 4, and 11, pressures below 29.00 (736.5) were reported; in the remaining only moderate or slight energy was displayed. East of W. 40° high westerly winds prevailed from the 2d to the 11th; from the 12th to the 15th the winds were generally light and variable; from the 16th to the 28th prevailing from the east, and the 29th and 30th from the south. The month opened with an area of high pressure, 30.50 (774.6), central in N. 35°, W. 45°, and extending westward to the coast of the United States, where the pressure fell below 29.90 (759.4), in N. 40°, due to a low area central over the Lake region. This extended high area remained central in mid-ocean, between N. 30° and 40°, until the 11th, when it moved northeastward and was central off the coast of the British Isles on the 15th, with pressure 30.50 (774.6); from this date to the 18th, inclusive, it extended westward to the thirtieth meridian. On the 10th an area of high pressure passed off the coast of the United States, and on the 11th the pressure was above 30.00 (762.2) over the whole Atlantic between N. 30° and 48°; on the 12th the high area was central near N. 40°, W. 60°, where pressures ranging from 30.70 (779.7) to 30.80 (782.2) were reported, and on the 13th extended eastward to the meridian of W. 50°; on the 14th to W. 45°; on the 15th to W. 40°; and on the 16th joined the high area above described off the British Isles, giving continuously high pressures from America to Europe. On the 17th and 18th the development of depressions numbers 6 and 7 broke this extensive area of high pressure, which then rapidly disappeared. By the 20th low pressure had overspread the whole ocean, except off the coast of the United States, being lowest in the mid-Atlantic, where 29.50 (749.2) was reported. This generally extended low area continued, with falling barometer, from this date to the close of the month, when the pressure at the centre of depression number 11 was reported below 29.00 (736.5).

The following are brief descriptions of the depressions charted:

1.—This storm was the most severe of any occurring during the month, the pressure at the centre ranging from 28.10 (713.7) to 28.75 (730.2). With no indication of its formation on the morning of March 31st, it appeared suddenly near N. 47°, W. 32°, during the afternoon of that date and blew with terrific violence. The hurricane moved northeastward, and at 12 noon (Greenwich time) of the 2d is charted off the northwest coast of the British Isles.

The following special reports describe its formation and severity:

Capt. J. W. Jones, of the s. s. "Chicago," in N. 46° 40', W. 32°, reports: "At noon March 31st, every appearance of a severe storm, the whole sky being of leaden hue, wind increasing to a hurricane, and barometer falling rapidly, reaching 29.28 (743.7) at 5 p. m.; the wind blew in severe gusts from wsw.; at 6 p. m. wind suddenly shifted to nw., blowing tremendously, and terrific sea running; moderated towards midnight, barometer rising." The s. s. "Lord Clive," P. Urquhart, commanding, at 11.30 p. m. (Greenwich mean time) reports wind suddenly increased from an ordinary gale of force about 10 to a terrific hurricane from the nnw., with barometer at 28.20 (716.3), which commenced to rise at once. The hurricane lasted

about one and a half hours, and subsided into a gale. Position, noon (Greenwich mean time) 31st, N. 48° 40', W. 29° 22'. The s. s. "Hermann," H. Baur, commanding, in N. 48°, W. 22° 40' to 26°, from noon (Greenwich mean time), March 31st, to April 1st, reports: "31st, 9.40 p. m. (Greenwich mean time), sky dark and gloomy; wind sets in from west with force 7, backs to sse., increasing to force 10, and blowing with this force until 17 h. and 20 m., when it veered to wsw. and wnw., and abated to force 5; at 18 h. it suddenly blew a hurricane from the nne. until 20 h. 10 m.; water and air were indistinguishable at 20.10, wind moderated to force 11, and at 21.40 to 10, blowing with this force from the north and raising a terribly high sea, with heavy breakers, until 6 h. April 1st, then wind and weather moderated gradually."

The following bi-hourly barometer readings, corrected for temperature, are given:

Date.*	Time.	Pressure.	Remarks.
	H. M.	Inches.	
March 31.....	5 30	29.91	This barometer has a correction of + 0.02 inch. Location at time of lowest barometer, N. 47° 42', W. 25° 42'.
Do.....	7 30	29.81	
Do.....	9 30	29.64	
Do.....	11 30	29.25	
Do.....	13 30	28.91	
Do.....	15 30	28.71	
Do.....	17 30	28.51	
Do.....	19 30	28.70	
Do.....	21 30	29.11	
Do.....	23 30	29.32	
April 1.....	1 30	29.44	
Do.....	3 30	29.51	

* Greenwich dates and hours; date begins at noon.

Capt. M. Fitt, of the s. s. "Virginian," reports: "March 31st, 8 p. m., wind south with dark overcast weather and rain, with a very confused sea; glass falling rapidly; 10 p. m., wind shifted to the west with heavy gusts of wind and rain; at midnight the barometer had fallen to 28.55 (725.2), and a fierce nne. wind blew with hurricane force, continuing for six hours; as soon as the wind veered from s. to nne. the pressure began to rise rapidly; position at 12 noon, Greenwich time, April 1st, N. 48° 08', W. 30° 22'." R. Inkster, mate of the s. s. "Queen," reports: "March 31st, at 12 hours (midnight, Greenwich mean time), barometer 28.70 (729.0), wind variable and moderate, shifting from sw. to nw. with heavy rain; wind increased rapidly to a hurricane, reaching its greatest force at 16 hours (Greenwich mean time); position at noon (Greenwich mean time), April 1st, N. 47° 18', W. 26° 28'."

The following is furnished by Mr. J. H. Newman, of the s. s. "Denmark," R. S. Rigby, commanding:

The centre of a violent hurricane, proceeding about ne. by e., or ene., passed this vessel on April 1st, in N. 49° 10', W. 20° 48'. The weather had been rough and unsettled for several days previous, the wind shifting between sw. and nw., blowing strong, with heavy confused seas, and barometer ranging from 29.60 (749.3) to 29.90 (759.4), and temperature from 40° to 50° Fahr. During the whole night of March 30th flashes of distant lightning were observed in the sw. and western horizons, and the sky appeared very threatening. The wind being then wnw., blew a fresh gale, accompanied by fierce squalls and hail, with a high sea and rising barometer. At 1.30 (Greenwich mean time), March 31st, the barometer, standing then at 29.86 (758.4), began to fall and the wind moderated rapidly; at 7.45 light variable airs, falling barometer, and rising temperature; from 10.15 to 13.15 the barometer fell at the rate of one-tenth of an inch an hour, while the wind gradually backed from w. to s., and increased rapidly.

Passage of the southeast quadrant of the hurricane.—At 13.20 (Greenwich mean time) the gale blew strong about s. by w., the sky was obscured by dense, smoky looking clouds and a very heavy sea was running; at 14.50 the course was altered from w. $\frac{1}{2}$ s. to wnw., which course was kept until 18.22; during this time the barometer fell at the rate of 0.16 inch per hour, showing a quicker approach to the vortex; the wind also increased, accompanied by heavy rain and a dangerous southerly sea; at 18.22 the course was again altered to ssw., after which the barometer fell slower (about .10 inch per hour) until 1.12 April 1st, when it reached its lowest reading, 28.08 (713.2). The wind had decreased rapidly during the previous two hours; the clouds broke, but still appeared threatening, and a swell began to rise from the nw.; at 1.30 it was nearly calm, and the centre or vortex may have passed about this time.

Passage of the southwest quadrant of the hurricane.—At 1.43 the wind veered to w.; at 2.08 from w. to nw. by w., and suddenly began to blow with hurricane force; the sea confused and very dangerous, causing the vessel to

labor very heavily and ship large quantities of water; at 3.28 the barometer rose rapidly at the rate of .29 inch per hour; 5.28, the gale broke into terrific squalls, accompanied by hail, after which the barometer rose slowly and the squalls became less frequent and severe; 14.30, phosphorescent lights were seen on each masthead and foreyard-arms, where they remained for some time. The weather continued rough, with a heavy confused sea, for several days, with a mean pressure of 29.52 (749.8).

The following table exhibits the variations in the pressure during the passage of the hurricane, together with the wind-direction and temperature:

Date.*	Greenwich mean time.	Barometer.	Wind.	Temperature.
		Inches.		°
March 31.....	1.14	29.86	wnw.	40
Do.....	10.15	29.68	w.	46
Do.....	13.15	29.36	s. by w.	48
Do.....	17.20	28.72	s. by w.	50
Do.....	22.27	28.40	s. by w.	30
April 1.....	1.27	28.08	calm	49
Do.....	5.28	28.77	nw. by w.	46
Do.....	10.28	29.22	nw.	37
Do.....	14.28	29.30	nw.	39
Do.....	18.29	29.44	nw.	42
Do.....	22.29	29.52	nw.	44

* Date begins at noon, Greenwich time.

The s. s. "Rhyndland," J. C. Jamison, commanding, had gale setting in from the ssw., and shifting between se. and sw.; moderated for half an hour, then had a whole gale of hurricane violence from the nw. The barometer was lowest in N. 48° 40', W. 20° 52'.

The following pressures were observed:

Date.*	Hours.	Pressure.	
		Uncorrected.	Corrected.
		Inches.	Inches.
March 31.....	23	28.89	28.76
Do.....	24	28.79	28.66
April 1.....	1	28.59	28.46

* Greenwich dates and hours; date begins at noon.

The s. s. "India," M. Kilsen, commanding, encountered a hurricane lasting from 10 p. m., March 31st, to 9 a. m., April 1st, blowing these eleven hours with a force of 12. In N. 47° 50', W. 24° 45', the barometer fell to 28.26 (717.8), corrected reading, at 2 a. m., April 1st. The s. s. "Palestine," W. Whiteway, commanding, reports: April 1st, in N. 51° 06', W. 23° 30', fresh se. breeze and heavy rain, wind shifted to ne. and began strong gale at 6 a. m., with hail and snow and very high seas, then backed to n. at 8 a. m. and blew with hurricane force, accompanied by hail, snow, and violent squalls; hove ship to, with head to wind; 8 p. m. gale began to moderate; barometer 29.04 (737.6) at noon, after which it began to rise.

The s. s. "Milanese," John Trinick, commanding, in N. 45° 44', W. 25° 51', April 1st, reports gale continued from midnight of March 31st, blowing with storm force, veered to wnw. at 1 a. m.; barometer at noon April 1st, 29.76 (755.9). The s. s. "Scythia," T. Roberts, commanding, in N. 51° 13', W. 13° 9', had lowest barometer, 29.27 (743.4), at 8 p. m. April 1st; gale set in from wsw. on the 31st, accompanied by lightning in the west; increased to whole gale on the 1st, continuing with same force on the 2d, with fierce hail squalls and heavy seas. The s. s. "City of Berlin," Francis Land, commanding, reports: "9 a. m. (Greenwich mean time) April 1st, in N. 51°, W. 17°, had a severe gale from the south with a very high sea; lowest barometer at 9 p. m. (Greenwich mean time) on the 2d, 28.74 (730.6); wind veered from sw. to wnw. and blew with force 11 and 12, accompanied by violent squalls." Capt. A. E. Jadel, of the s. s. "Canada," reports: "From 1 a. m. to 4 a. m. on the 1st very stormy from south, followed by calm for an hour, after which a north-wind hurricane, force 12, set in with the heaviest sea I ever experienced. In N. 48° 53', W. 25° 25', the barometer fell to 28.35 (720.2) at 4 a. m."

The following table gives additional observations, from other

vessels, of the lowest pressure observed during the passage of this storm, with the position and time of observation:

Steamship.	Position.	Date.	Hour	Pressure.
	N. / W. /			Inches.
Moravia.....	N. 47 50, W. 29 26	Mar. 31	12 midnight..	28.80
Grecian Monarch.....	N. 48 48, W. 27 00	Apr. 1	2 a. m.....	28.74
Lepanto.....	N. 44 49, W. 26 2	Apr. 1	4 a. m.....	29.35
Waldensian.....	N. 50 43, W. 26 2	Apr. 1	4 a. m.....	29.35
Richmond Hill.....	N. 50 4, W. 15 6	Apr. 1	4.30 p. m.....	28.29

2.—This storm appeared on the 6th near N. 50°, W. 39°, and was apparently drawn eastward and absorbed by the extensive storm-area which appeared off the coast of Ireland on the 8th. The s. s. "Devonia," in N. 52°, W. 28° 30', had pressure 29.30 (744.1), at 6 p. m. of the 6th, with wind blowing a whole gale from the s. to e. At 7 a. m. of the 6th vessels to the south of the storm-centre had pressure ranging from 29.79 (756.6) to 29.97 (761.1), with moderate westerly winds, while to the eastward the wind was southerly, with rain.

3.—This depression is a continuation of low area number ii described in this REVIEW. It reached the New Jersey coast on the 7th, and was appreciable off the middle Atlantic coast on the 6th, where fresh to strong southerly gales and rain were reported. During the 7th the depression moved eastward off the New Jersey coast and at 7 a. m. of the 8th was central N. 41°, W. 65°, with a barometric pressure of 29.70 (754.3), rain and moderate winds centering to this point. During the next twenty-four hours it moved north of east to N. 44°, W. 54°, with a slight increase in pressure. Vessels to the southward and eastward reported southerly winds and fair weather. By the morning of the 10th it had moved to N. 45°, W. 49°, with rain and fresh westerly winds to the southward, and moderate southwest gales to the southeast. At 7 a. m. of the 11th the depression had moved northeastward to N. 53°, W. 33°. The pressure had fallen slightly to about 29.70 (754.3), and moderate southwest gales and fair weather were reported to the southeastward. The storm thereafter pursued a northeastwardly course beyond the region of observation.

4.—This storm appeared on the southern coast of Ireland on the morning of the 8th, having apparently advanced from the northwest, and dominated the wind-direction as far as W. 35°. The pressure ranged to 29.16 (740.6) and increased rapidly to the westward. Strong west to northwest gales were reported to W. 31°, continuing during the 9th and 10th, and accompanied by heavy rain, hail, and snow squalls off the south and southeast coasts of Ireland. The s. s. "Catalonia," Capt. Alex. McKay, commanding, encountered a strong westerly gale, April 8th, in N. 51° 20', W. 10° 00', barometer, 29.25 (742.9) at 4 a. m. "The storm continued during the 8th and 9th accompanied by hard hail squalls; blowing heaviest on the 9th from the northwest, with rising barometer." Capt. E. Parry, of s. s. "Bulgarian," reported as follows: "April 9th, in N. 51° 48', W. 7° 01', strong breeze, northwest, with snow squalls; fresh breeze, northwest, with heavy hail squalls at midnight. April 10th, in N. 51° 11', W. 12° 31', moderate gale, nw. in a. m., veering to north and increasing to fresh gale, with heavy squalls and high seas, moderating at midnight." The area of lowest pressure moved eastward beyond the region of observation during the 8th, but strong westerly gales continued during the 9th, 10th, and 11th, to N. 44°.

5.—This storm appeared on the 12th in N. 42°, W. 40°, with a pressure of about 29.88 (759.0). During that date fresh to strong northerly gales and rain were reported by vessels to the northward and northwestward. On the morning of the 13th the storm-centre had moved due east one degree and the pressure had diminished to about 29.67 (753.5). Fresh to brisk gales, centering to the low area, accompanied by rain, were reported by vessels between N. 40° and 49°, and W. 30° and 40°. From this point the depression assumed a northeasterly course, being central at 7 a. m. of the 14th near N. 45°, W. 37°. Fresh to strong gales, with clearing weather, were reported by

vessels in the vicinity. During this date the depression moved northward out of the region of observation.

6.—The presence of this depression is indicated by charted reports of the 17th; the area of low was apparently central about N. 39°, W. 40°. The s. s. "Hugo," in N. 37° 5', W. 46°, on that date, reported strong northwest gales, with rain and hail, continuing during the day, with a barometric pressure at 7.30 a. m. of 29.88 (759.0). From the 17th to the 22d the depression remained nearly stationary, with falling barometer and increasing energy.

The bark "Exile," in N. 39° 04', W. 40° 55', referring to this storm, reported, as follows: "21st, 6 p. m., strong wind, with heavy squalls of rain and very heavy gusts, amounting to force 10 in the gusts; barometer 29.45 (747.9); wind backing from west to southwest. 22d, 2 a. m., strong gale, with squalls of rain and heavy gusts of wind, backing to east; barometer 29.35 (745.0); 6 a. m., N. 39° 26', W. 43° 24', more moderate; no squalls; barometer 29.45 (747.9); a very heavy sea from west to north; barometer rising."

Reports from vessels to the west and northwest show strong north to west gales, rain, and heavy squalls between N. 39° and 45°, and W. 38° and 50°, from the 21st to the 24th. On the 22d the s. s. "Sacrobosco," R. S. Thompson, commanding, encountered in N. 41° 30', W. 48° 30', a west gale of 7 to 8, at 3 p. m. (Greenwich mean time); barometer 29.07 (738.3). At 9 a. m. (Greenwich mean time) of the 23d there had been no change in wind-direction or force, the barometer standing at 29.07 (738.3) firm. At 7 a. m. of the 23d this low area had moved to N. 39°, W. 29°, with rising barometer and decreasing force. On the morning of the 24th it is charted N. 40°, W. 23°, with fresh westerly gales to the southward. From thence it moved slightly south of east to N. 39°, W. 15°, from that point passing southeast beyond the limit of reports during the 25th and 26th.

7.—This depression first appeared on the morning of the 18th in N. 25°, W. 72°, with a barometric pressure of about 29.71 (754.5). During the 19th and 20th it moved northeastward, with slightly decreasing pressure, to N. 29°, W. 70°, from thence moving eastward to N. 29°, W. 65°, on the 21st, beyond the limits of reports. Capt. F. Stevens, commanding s. s. "Manhattan," makes the following report relative to this storm: "In N. 29° 56', W. 79° 36', on the 19th, encountered a whole gale from the ene., continuing, at intervals, until the 21st, with very heavy irregular seas; lowest barometer 30.07 (763.7), at 6.42 a. m. of the 19th."

8.—At 7 a. m. of the 21st a depression with barometer about 29.48 (748.7) appeared near N. 40°, W. 18°, moving slightly to the northeast during the ensuing twenty-four hours, accompanied to the southward by winds attaining the force of moderate gales. On the morning of the 23d the storm had moved northward to N. 47°, W. 15°, with decreasing pressure. It then pursued a northwesterly course to N. 50°, W. 19° on the 24th, and N. 55°, W. 25° on the 25th, accompanied during the 25th by rain to the east and southeastward.

9.—This storm appeared on the chart of the 22d in N. 47°, W. 44°, with a pressure of 29.61 (752.0). It took a southeasterly course to N. 45°, W. 41° by 7 a. m. of the 23d and to N. 44°, W. 40° by the morning of the 24th, with pressure decreasing to 29.31 (744.4) and fresh to strong west to north gales to the westward. On the morning of the 25th it appeared at N. 44°, W. 36°. Pursuing a northerly course the depression was central on the morning of the 26th at N. 46°, W. 35°, with slight barometric changes and brisk easterly gales and rain to the northeastward. At 7 a. m. of the 27th it had moved north of east to N. 47°, W. 30°, with rising barometer and fresh gales centering to that point. During the 27th it passed northeastward out of the line of reports. The reports at hand cite no unusual features in connection with this storm.

10.—This depression appeared in the Gulf of Saint Lawrence on the morning of the 24th, with a pressure of 29.47 (748.5) at Sydney. Passing rapidly southeastward the storm was central at 7 a. m. of the 25th at N. 44°, W. 50°, with a pressure of

29.55 (750.5), after which date it disappeared, without developing noteworthy features.

11.—This storm, following a northwesterly course, first appears on the 27th, in N. 41°, W. 49°, with a barometric pressure of 29.28 (743.6), accompanied by fresh and brisk gales and rain. On the morning of the 28th it had moved to N. 44°, W. 51°, with increasing pressure and diminishing wind force. From this point it moved slightly east of north to N. 45°, W. 50° on the morning of the 29th; passing out of the region of reports on that date. Beyond the prevalence of fresh and brisk gales and rain attending its course, no unusual features are reported as having been noted in connection with this storm.

12.—A slight barometric depression appeared on the 27th in N. 50°, W. 17°, from which point it moved south of east to N. 48°, W. 7° by the morning of the 28th, with a slight decrease in pressure, passing eastward of the region covered by maritime reports on this date. The storm was not of a violent nature.

13.—This depression appeared off the south Atlantic coast on the morning of the 29th, with a pressure of 29.50 (749.4), taking a northeasterly course to N. 37°, W. 70° by 7 a. m. of the 30th, with moderate northeast gales to the northward.

OCEAN ICE.

On chart i are also exhibited the eastern and southern limits of the region within which icebergs and field ice have been observed during April, 1886. These limits have been determined from reports furnished by shipmasters, and from trustworthy data published in the "New York Maritime Register" and other newspapers. During this month the easternmost iceberg was observed in N. 47° 43', W. 30° 11', by the ship "Ruby," E. E. Robbins, commanding; from that point westward to about W. 45°, but two isolated bergs were observed.

From N. 42° to N. 43°, between W. 49° and W. 50°, icebergs were very numerous, together with much thick field ice; the bergs, as a rule, were small. The southernmost iceberg was reported in N. 40° 51', W. 46° 59'.

A comparison with the chart for the preceding month (March, 1886) shows a very extensive and unusually rapid movement of ice to the eastward and southward; the eastern limit for April being about fourteen degrees further east than that of the preceding month. The southern limit is about four degrees south of the southern limit for March. As compared with April, 1885, the eastern limit is about nine degrees further east, and is the easternmost limit ever reported to this office for April.

The following table shows the comparison between April, 1886, and the same month of the three preceding years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Lon. W.	Month.	Lat. N.	Lon. W.
April, 1883.....	40 49	52 06	April, 1883.....	48 00	43 00
April, 1884.....	41 26	48 46	April, 1884.....	45 25	43 34
April, 1885.....	41 40	49 50	April, 1885.....	44 10	39 41
April, 1886.....	40 51	46 59	April, 1886.....	47 43	30 11

Icebergs and field ice were reported during April, 1886, as follows:

April 11th.—S. S. "State of Nebraska," in N. 45° 00', W. 47° 53', passed an iceberg and a small floe at 6.50 p. m.

12th.—S. S. "British Crown," in N. 44° 58', W. 47° 57', passed an iceberg at 2.30 p. m.

13th.—S. S. "Indiana," in N. 40° 51', W. 46° 59', passed a large iceberg.

16th.—S. S. "Jan Breydel," passed two icebergs, each about sixty feet high, in N. 44° 24', W. 48° 28'.

18th.—S. S. "Warwick," in N. 44° 00', W. 48° 00', at 9 p. m., passed a large quantity of thick field ice, extending for a number of miles. The s. s. "Elizabeth Allen," in N. 47° 00', W. 47° 20', passed through large quantities of ice.

19th.—S. S. "Zaandam," in N. 42° 47', W. 49° 24', passed four small icebergs at 10 p. m. The s. s. "Critic," in N. 43° 56', W.

48° 38', from noon to 3 p. m., passed through a number of icebergs and a quantity of thick field ice, extending a great distance in all directions. The s. s. "Hermann," in N. 42° 45', W. 49° 48', passed three detached pieces of floating ice, one piece being quite large, but not a berg. The s. s. "City of Chicago," in N. 42° 52', W. 49° 20', passed through ten miles of field ice. The s. s. "Azalea," in N. 42° 50', W. 49° 50', passed through a great quantity of field ice. The s. s. "Etna," in N. 42° 54', W. 49° 00', passed through a small quantity of field ice. The s. s. "Hammonia," in N. 43° 36', W. 49° 20', passed several small ice-fields. The s. s. "Ruby," in N. 47° 43', W. 30° 11', passed a large iceberg. The s. s. "Faedrelaudet," in N. 47° 11', W. 47° 29', at 2 p. m., passed large quantities of field ice.

20th.—S. S. "Faedrelaudet," in N. 44° 49', W. 48° 57', at 8 a. m., passed a large iceberg. The s. s. "Stockholm City," in N. 44° 50', W. 47° 10', at 5 a. m., passed two medium-sized icebergs, bearing se. and nw., and at 3.30 p. m. passed large quantities of drift ice, and at 6 p. m., in N. 44° 12', W. 50° 36' passed a large iceberg, bearing w. by n., and apparently grounded; at 8 p. m. less drift ice in vicinity of ship, temperature of air being 32° and water 37°. The s. s. "Gertrude," in N. 43° 36', W. 45°, passed large quantities of drift ice, and one very large iceberg.

22d.—S. S. "Peruvian," in N. 42° 55', W. 53° 39', from 8.30 to 11.30 a. m., passed patches of small field ice and several icebergs. The s. s. "Toronto," in N. 44° 20', W. 47° 30', toward evening passed a small patch of field ice. The ship "John T. Berry," in N. 44°, W. 52°, passed eighteen icebergs of various sizes and two fields of ice, one of which was about six miles long, could not see across it from aloft; the other about four miles long. The s. s. "Prussian," in N. 42° 40', W. 49° 30', at 9 a. m., passed two small icebergs, and at 9.40 a. m., in N. 42° 40', W. 50° 20', passed large quantities of detached and field ice, extending about thirty miles, and at 11.20 a. m., passed one large iceberg; clear of all ice at noon. The s. s. "Circassia," in N. 43° 36' to 42°, W. 48° 50' to 50°, from 10.15 a. m. to 4 p. m., passed a number of icebergs, one very large, and a large quantity of field ice. The s. s. "Polaria," in N. 42° 30', W. 50° 40', passed a medium-sized iceberg. The s. s. "A. McDougall," in N. 42° 40', W. 49° 34', passed two small icebergs; in N. 42° 41', W. 50° 09', passed a large iceberg; between these two positions was a large quantity of detached and field ice, extending westward about twenty-seven miles.

23d.—S. S. "Jersey City," in N. 45°, W. 46°, passed three large icebergs. The bark "Mithassel," in N. 43°, W. 49°, passed through a quantity of enormous icebergs. The ship "Ruby," in N. 43°, W. 48° to 50°, passed nine large bergs and a considerable quantity of drift ice.

24th.—S. S. "State of Indiana," in N. 42° 40', W. 49° 50', to N. 42° 18', W. 51° 58', from 7 a. m. to 3.30 p. m., passed twelve icebergs, some of them very large, and a quantity of thick field ice. The s. s. "Nevada," in N. 42° 55', W. 50° 20', passed two large icebergs. The s. s. "Columbia," from 8 a. m. to 2 p. m., in N. 42° 20', W. 49° 30', and N. 42° 20', W. 49° 57', and N. 42° 20', W. 50° 11', and N. 42° 14', W. 51° 01', passed several icebergs and some thick field ice. The s. s. "Crystal," in N. 45° 20', W. 48° 30', at 6 a. m., passed through a quantity of broken ice, apparently a collapsed iceberg. The s. s. "Main," in N. 43° 28', W. 49° 19', passed three small icebergs. The s. s. "Wyoming," in N. 43°, W. 50°, passed a number of immense icebergs.

25th.—S. S. "Helvetia," in N. 42° 27', W. 49° 43', passed a large iceberg and several large pieces of ice. The s. s. "Thingvall," in N. 44° 5', W. 49° 51', passed two small icebergs; s. s. "Germanic," at 2 p. m., in N. 42° 33', W. 50° 34', passed a large iceberg, and at 3 p. m., in N. 42° 37', W. 50° 15', passed a large iceberg, and at 4 p. m., in N. 42° 31', W. 49° 49', passed a large iceberg; ship "Prince Victor," in N. 47°, W. —, passed through much field ice; steered one hundred and fifty miles to the southward to clear it.

26th.—Ship "New City," in N. 43°, W. 48°, passed one very large and three medium-sized icebergs.

27th.—S. S. "Furnesia," in N. 42° 37' to 42° 39', W. 52° 27', passed two icebergs; s. s. "California," at 7.30 a. m., in N. 42° 16', W. 51° 36', passed two icebergs; s. s. "Durham City," passed two very large icebergs, each about one hundred feet high; one at 9.45 a. m., N. 43° 26', W. 49° 30'; the other at 5.30 p. m., in N. 43° 5', W. 51° 55'; s. s. "Westphalia," in N. 42° 50', W. 50° 40', at 8 a. m., passed a small iceberg; temperature of water, 28°; air, 33°; another, thirty-six feet high, in N. 42° 40', W. 51° 20', at 10.35 a. m.; temperature of water, 30°; air, 39°; and in N. 42° 35', W. 52° 04', two from forty to eighty feet high; temperature of water, 42°; air, 42°; s. s. "City of Montreal," passed icebergs, from 1 to 7 p. m., between N. 42° 41', W. 49° 50', and N. 42° 35', W. 52° 14'.

28th.—S. S. "City of Montreal," passed icebergs at 12 m., in N. 42° 18', W. 55° 30'; s. s. "Rhaetia," in N. 47° 26', W. 40° 43'; passed a small piece of ice twelve feet in length; s. s. "Australia," in N. 42° 22', W. 50° 14' passed a small iceberg; temperature of water, 36°; air, 39°; passed another iceberg, seventy feet high and three hundred feet long, in N. 42° 19', W. 51° 42'.

29th.—S. S. "Umbria," between N. 42° 53', W. 50° 19', and N. 42° 14', W. 52° 12', from 12.40 p. m. to 5.10 p. m., passed several icebergs; s. s. "Australia," in N. 42° 19', W. 57° 42', passed an iceberg about seventy feet high.

30th.—S. S. "Venetian," in N. 43° 27', W. 49° 25' at 9.10 a. m., passed an iceberg six hundred feet long, one hundred and fifty feet wide and one hundred and twenty feet high; s. s. "Bracadaile," between N. 45° 43', W. 51° 45' and N. 45° 33', W. 55° 10', from 2.35 p. m. to 3.30 a. m., passed a large iceberg, then passed through small scattering ones and finally passed a very large one; ship "Thos. Hilyard," in N. 42° 20', W. 50° 30', passed an iceberg; s. s. "Norwegian," passed an iceberg at 10 a. m., in N. 42° 19', W. 49° 53', and at 3.30 p. m., in N. 42° 15', W. 51° 04', passed an iceberg and two small pieces of ice.

SIGNAL SERVICE AGENCIES.

Signal Service agencies have been established in the Maritime Exchange buildings at New York City and Philadelphia, and in the Custom-House, Boston, where the necessary blanks and other information will be furnished to ship-masters.

In pursuance of the arrangements made with the Meteorological Office of London, England, there were cabled to that office from New York during April, 1886, four reports concerning storms encountered by vessels in the Atlantic west of the forty-fifth meridian; one message was sent from Boston.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada for April, 1886, is exhibited on chart ii by the dotted isothermal lines; and in the tables of miscellaneous data are given the monthly mean temperatures, with the departures from the normal, for the various stations of the Signal Service.

On chart iv the departures from the normal temperature are illustrated by lines connecting stations of normal or equal abnormal values.

Over the northern districts, east of the Rocky Mountains, the mean temperatures for April, 1886, are above the normal; on the Pacific coast, in the middle slope, middle plateau, and over all southern districts they are below the normal. The most marked departures above the normal occurred in northern Minnesota, where, at Saint Vincent and Moorhead, they amount to 9° 4 and 7° 2, respectively. In the upper Mississippi and upper Ohio valleys and over portions of the lower lake region, New England, and the middle Atlantic states the temperatures generally range from 4° to 5° above the normal.

Over the country where the temperatures are below the normal, departures are generally slight; they nowhere exceed 5°, and for the most part are less than 2°. The departures below the normal are greatest in Florida and along the Gulf coast.

The following are some of the most marked departures from the normal temperature at Signal Service stations:

Above normal.		Below normal.	
Saint Vincent, Minnesota	9.4	Sanford, Florida	4.7
Mount Washington, New Hampshire	7.7	Cedar Keys, Florida	4.6
Moorhead, Minnesota	7.2	San Antonio, Texas	4.2
Pittsburg, Pennsylvania	5.5	Winnemucca, Nevada	3.4
La Crosse, Wisconsin	5.4	New Orleans, Louisiana	3.2
Albany, New York	5.2	Brownsville, Texas	3.1
Buffalo, New York	5.1	Mobile, Alabama	3.1
Bismarck, Dakota	4.6	Galveston, Texas	3.0

DEVIATIONS FROM NORMAL TEMPERATURES.

In the table below are given, for certain stations, as reported by voluntary observers, the normal temperatures for April for a series of years, the mean temperature for April, 1886, and the departures from the normal:

Station.	County.	Normal temperature for April.	Number of years.	Mean temperature for April, 1886.	Departure.
<i>Arkansas.</i>					
Lead Hill	Boone	60.9	4	60.0	- 0.9
<i>California.</i>					
Sacramento	Sacramento	59.3	20	58.4	- 0.9
<i>Connecticut.</i>					
Middletown	Middlesex	45.4	28	49.6	+ 4.2
New Haven	New Haven	46.8	100	48.3	+ 1.5
Thompson	Windham	44.2	30	48.7	+ 4.5
<i>Dakota.</i>					
Webster	Day	43.2	3	49.5	+ 6.3
<i>Illinois.</i>					
Anna	Union	57.7	11	58.2	+ 0.5
Mattoon	Coles	53.0	6	57.0	+ 4.0
Peoria	Peoria	51.9	30	57.7	+ 5.8
Riley	McHenry	44.2	25	47.4	+ 3.2
Sycamore	De Kalb	45.0	4	48.3	+ 2.7
<i>Indiana.</i>					
Lafayette	Tippecanoe	49.9	7	53.9	+ 4.0
Logansport	Cass	53.0	31	57.7	+ 4.7
Spiceland	Henry	49.9	32	53.3	+ 3.4
Vevay	Switzerland	54.8	21	55.9	+ 1.1
<i>Iowa.</i>					
Clinton	Clinton	48.8	8	51.3	+ 2.5
Cresco	Howard	43.9	10	48.1	+ 4.2
Monticello	Jones	48.1	33	50.9	+ 2.8
<i>Kansas.</i>					
Independence	Montgomery	56.9	15	55.3	- 1.6
Wellington	Sumner	55.3	8	54.3	- 1.0
Yates Centre	Woodson	53.6	6	53.7	+ 0.1
<i>Maine.</i>					
Belfast	Waldo	41.1	27	45.0	+ 3.9
Bridgeton	Cumberland	41.5	11	45.3	+ 3.8
Cornish	York	40.4	29	46.1	+ 5.7
Gardiner	Kennebec	41.4	50	44.5	+ 3.1
Orono	Penobscot	40.0	18	43.6	+ 3.6
<i>Maryland.</i>					
Fallston	Harford	49.6	15	52.1	+ 2.5
<i>Massachusetts.</i>					
Amherst	Hampshire	45.2	49	51.3	+ 6.1
Cambridge	Middlesex	44.3	64	49.0	+ 4.7
Fitchburg	Worcester	42.5	30	47.7	+ 5.2
Lowell	Middlesex	45.0	10	50.6	+ 5.6
New Bedford	Bristol	44.5	74	46.9	+ 2.4
Somerset	Bristol	45.4	16	50.2	+ 4.8
Taunton	Bristol	46.5	16	49.1	+ 2.6
Springfield	Hampden	46.0	19	51.7	+ 5.7
Williamstown	Berkshire	43.4	33	48.2	+ 4.8
Worcester	Worcester	44.7	47	48.1	+ 3.4
<i>Nevada.</i>					
Carson City	Ormsby	47.7	7	47.5	- 0.2
<i>New Brunswick.</i>					
Saint John	Saint John	37.4	26	39.1	+ 1.7
<i>New Hampshire.</i>					
Concord	Merrimac	46.8	18	50.4	+ 3.6
Hanover	Grafton	41.3	25	46.7	+ 5.4
<i>New Jersey.</i>					
South Orange	Essex	48.4	16	51.4	+ 3.0
<i>New York.</i>					
North Volney	Oswego	41.3	19	47.0	+ 5.7
Palermo	Oswego	41.3	33	46.4	+ 5.1
Plattsburg Barracks	Clinton	40.7	17	45.3	+ 4.6
<i>Ohio.</i>					
Wauseon	Fulton	46.1	16	50.8	+ 4.7
<i>Pennsylvania.</i>					
Wellsborough	Tioga	43.9	15	52.0	+ 8.1
<i>South Carolina.</i>					
Stateburg	Sumpter	62.1	6	62.6	+ 0.5
<i>Texas.</i>					
New Ulm	Austin	68.3	14	66.6	- 1.7
<i>Vermont.</i>					
Lunenburg	Essex	37.9	38	44.1	+ 6.2
Stratford	Orange	41.1	12	48.3	+ 7.2
<i>Virginia.</i>					
Bird's Nest	Northampton	54.8	18	57.9	+ 3.1
Dale Enterprise	Rockingham	51.7	6	59.1	+ 7.4
Variety Mills	Nelson	54.0	9	54.8	+ 0.8
Wytheville	Wythe	52.1	22	54.0	+ 1.9
<i>West Virginia.</i>					
Helvetia	Randolph	48.2	10	51.5	+ 3.3

* From the "Bulletin of the New England Meteorological Society."